

**Section 49 - Control of Volatile Organic Compound Emissions from Volatile Organic Liquid Storage Vessels**

11/29/94

a. Applicability.

1. Except as provided for in (a)(2) this Section applies to each storage vessel with a capacity equal to or greater than 40,000 gallons (gal) that is used to store volatile organic liquids (VOL's).
2. This Section does not apply to:
  - i. Storage vessels with a capacity less than 5,000 gal.
  - ii. Storage vessels with a capacity equal to or greater than 5,000 gal and less than 40,000 gal provided that records are maintained consistent with (e)(2).
  - iii. Storage vessels with a capacity equal to or greater than 40,000 gal storing a liquid with a maximum true vapor pressure less than 1.0 psia provided that records are maintained consistent with (e)(2).
  - iv. Storage vessels with a capacity equal to or greater than 40,000 gal storing a liquid with a maximum true vapor pressure equal to or greater than 1.0 psia but less than 1.5 psia provided that records are maintained consistent with (e)(1), (e)(2), and (e)(3) (if applicable).
  - v. Storage vessels whose emissions to the atmosphere are covered by:
    - A. Any other Section of this regulation.
    - B. Any federal rule.
  - vi. Storage vessels at coke oven by-product plants.
  - vii. Pressure vessels which operate without emissions to the atmosphere.
  - viii. Storage vessels permanently attached to mobile vehicles such as trucks, railcars, barges, or ships.
  - ix. Storage vessels used to store beverage alcohol.
3. Any owner or operator currently permitted under Regulation No. 2 to operate a

storage vessel covered by this Section shall submit to the Department, within 90 days of the effective date of this Section, an application to amend the current permit and to comply with the provisions of this Section.

4. Any owner or operator of a non-permitted storage vessel subject to the provisions of this Section, on and after the effective date of this Section, shall immediately submit to the Department an application for a permit to construct, modify, reconstruct and/or operate the storage vessel.
  5. Any owner or operator of a permitted or a non-permitted storage vessel that becomes subject to the provisions of this Section after the effective date of this Section shall submit to the Department an application for a permit or an application to amend the current permit to comply with the provisions of this Section, and shall receive approval of his application from the Department prior to constructing, modifying, reconstructing and/or operating the storage vessel.
- b. Definitions. As used in this Section, all terms not defined herein shall have the meaning given them in the November 15, 1990 Clean Air Act Amendments, or in Section No. 2 of this regulation.

"Fill" means the introduction of VOL into a storage vessel but not necessarily to complete capacity.

"Mechanical Shoe Seal" means a metal sheet held vertically against the wall of the storage vessel by springs or weighted levers and connected by braces to the floating roof.

c. Standards.

1. The owner or operator of each storage vessel with a capacity equal to or greater than 40,000 gal which contains a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 1.5 psia but less than 11.1 psia shall equip the storage vessel with the equipment specified in either (c)(1)(i), (c)(1)(ii), (c)(1)(iii), or (c)(1)(iv); whichever is applicable.
  - i. Each fixed roof tank shall be equipped with an internal floating roof as specified below, or a vapor control system as specified in (c)(1)(iii), or an equivalent system as specified in (C)(1)(iv).
    - A. Each internal floating roof shall meet all of the specifications stated in (c)(1)(i)(B) through (c)(1)(i)(L) according to the following schedule:

1. Each fixed roof tank that is not equipped with an internal floating roof as of the effective date of this Section shall be in compliance with this standard prior to filling the tank following the next scheduled tank cleaning, and no later than April 1, 1996.
2. Each fixed roof tank that is equipped with an internal floating roof as of the effective date of this Section shall be in compliance with this standard prior to filling the tank following the next scheduled tank cleaning, and no later than 10 years after the effective date of this Section.
3. Each fixed roof tank for which construction is to commence after the effective date of this Section shall be in compliance with this standard prior to initially filling the tank.
4. Each existing fixed roof tank that becomes subject to the provisions of this Section after the effective date of this Section shall be in compliance with this standard prior to filling the tank.

- B. The internal floating roof shall rest or float on the liquid surface, but not necessarily in complete contact with it.
- C. The internal floating roof shall be floating on the liquid surface at all times except during those intervals when the storage vessel is being completely emptied and subsequently filled.
- D. When the internal floating roof is resting on the leg supports the process of filling or emptying shall be continuous and shall be accomplished as rapidly as possible.
- E. Each internal floating roof shall be equipped with one of the following closure devices between the wall of the storage vessel and the edge of the internal floating roof:
1. A foam-or liquid-filled seal mounted in contact with the liquid (liquid-mounted seal).
  2. Two seals mounted one above the other so that each forms a continuous closure that completely covers the

space between the wall of the storage vessel and the edge of the internal floating roof. The lower seal may be vapor-mounted, but both must be continuous.

3. A mechanical shoe seal.

- F. Each opening in a noncontact internal floating roof except for the automatic bleeder vents (vacuum breaker vents) and the rim space vents shall provide a projection below the liquid surface.
- G. Each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains shall be equipped with a cover, seal, or lid which shall be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket.
- H. Covers on each access hatch and automatic gauge float well shall be bolted except when they are in actual use.
- I. Automatic bleeder vents shall be equipped with a gasket and shall be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.
- J. Rim space vents shall be equipped with a gasket and shall be set to open only when the internal floating roof is being floated off the roof leg supports or at the manufacturer's recommended setting.
- K. Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening.
- L. Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.
- ii. Each external floating roof tank shall be equipped with an external floating roof as specified below, or a vapor control system as specified in (c)(1)(iii), or an equivalent system as specified in (C)(1)(iv).
  - A. Each external floating roof tank shall meet all of the specifications stated in (c)(1)(ii)(B) through (c)(1)(ii)(I) according to the following schedule:

1. Each existing external floating roof tank shall be in compliance with this standard prior to filling the tank following the next scheduled tank cleaning, and no later than 10 years after the effective date of this Section.
  2. Each external floating roof tank for which construction is to commence after the effective date of this section shall be in compliance with this standard prior to initially filling the tank.
  3. Each existing external floating roof tank that becomes subject to the provisions of this Section after the effective date of this Section shall be in compliance with this standard prior to filling the tank.
- B. The roof shall be floating on the liquid surface at all times except during those intervals when the storage vessel is being completely emptied and subsequently filled.
- C. When the roof is resting on the leg supports the process of filling or emptying shall be continuous and shall be accomplished as rapidly as possible.
- D. Each external floating roof shall be equipped with a closure device between the wall of the storage vessel and the roof edge.
  1. The closure device shall consist of two seals, one above the other. The lower seal is referred to as the primary seal and the upper seal is referred to as the secondary seal.
  2. The primary seal shall be either a mechanical shoe seal or a liquid mounted seal.
  3. One end of the mechanical shoe seal, if used, shall extend into the stored liquid, and the other end shall extend a minimum vertical distance of 24 in. above the stored liquid surface.
  4. As determined by the method in (d)(2)(iii)(A) the width of any portion of any gap between the tank wall and:

i. The primary seal shall not exceed 1.5 in.

ii. The secondary seal shall not exceed 0.5 in.

5. As determined by the method in (d)(2)(iii)(B) the accumulated area of gaps between the tank wall and:

i. The primary seal shall not exceed 10 in<sup>2</sup> per foot of tank diameter.

ii. The secondary seal shall not exceed 1.0 in<sup>2</sup> per foot of tank diameter.

E. Each opening in a noncontact external floating roof except for the automatic bleeder vents (vacuum breaker vents) and the rim space vents shall provide a projection below the liquid surface.

F. Each opening in the roof except for leg sleeves, automatic bleeder vents, rim space vents, and roof drains shall be equipped with a cover, seal, or lid which shall be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket.

G. Automatic bleeder vents shall be equipped with a gasket and shall be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.

H. Rim space vents shall be equipped with a gasket and shall be set to open only when the roof is being floated off the roof leg supports or at the manufacturer's recommended setting.

I. Each emergency roof drain is to be provided with a slotted membrane fabric cover that covers at least 90 percent of the area of the opening.

iii. As an alternative to installing the internal floating roof specified in (c)(1)(i) or the external floating roof specified in (c)(1)(ii), or as required by (c)(2)(i), or where the control technologies specified in

(c)(1)(i) and (c)(1)(ii) are not appropriate (e.g. horizontal storage vessels); emissions shall be controlled with a closed vent system and a control device.

A. Each closed vent system and control device shall meet the specifications stated in (c)(1)(iii)(B) through (c)(1)(iii)(D) according to the following schedule:

1. Each fixed roof tank that is not equipped with an internal floating roof as of the effective date of this Section shall be in compliance with this standard prior to filling the tank following the next scheduled tank cleaning, and no later than April 1, 1996.
2. Each fixed roof tank that is equipped with an internal floating roof as of the effective date of this Section, and each external floating roof tank shall be in compliance with this standard prior to filling the tank following the next scheduled tank cleaning, and no later than 10 years after the effective date of this Section.
3. Each tank for which construction is to commence after the effective date of this Section shall be in compliance with this standard prior to initially filling the tank.
4. Each existing tank that becomes subject to the provisions of this Section after the effective date of this Section shall be in compliance with this standard prior to filling the tank.

B. The closed vent system shall:

1. Collect all VOC vapors and gases discharged from the storage vessel.
2. Operate with no detectable emission as indicated by an instrument reading of less than 500 ppm above background and visual inspections, as determined by the methods specified in Appendix "F" of this Regulation.

C. The control device shall reduce the inlet VOC emissions by 95 weight percent or greater.

D. If a flare is used as the control device, it shall meet the specifications described in 40 CFR Part 60, paragraph 60.18 (July 1, 1992).

iv. If, in the Department's judgment, an alternative means of emission limitation will achieve a reduction in emissions at least equivalent to the reduction in emissions achieved by (c)(1)(i), (c)(1)(ii), or (c)(1)(iii), whichever is applicable, the owner or operator shall:

A. Be in compliance with the applicable standard according to the following schedule:

1. Each fixed roof tank that is not equipped with an internal floating roof as of the effective date of this Section shall be in compliance with the applicable standard prior to filling the tank following the next scheduled tank cleaning, and no later than April 1, 1996.
2. Each fixed roof tank that is equipped with an internal floating roof as of the effective date of this Section, and each external floating roof tank shall be in compliance with the applicable standard prior to filling the tank following the next scheduled tank cleaning, and no later than 10 years after the effective date of this Section.
3. Each tank for which construction is to commence after the effective date of this Section shall be in compliance with the applicable standard prior to initially filling the tank.
4. Each tank that becomes subject to the provisions of this Section after the effective date of this Section shall be in compliance with this standard prior to filling the tank.

B. Submit to the Department a written application including, at a minimum:

1. An actual emissions test that uses a full-sized or scale-model storage vessel that accurately collects and measures all VOC emissions from a given control device and that accurately simulates wind and accounts for other emission variables such as temperature and

barometric pressure, or

2. An engineering evaluation that the Department determines is an accurate method of determining equivalence.

C. The Department may condition the approval on requirements that may be necessary to ensure operation and maintenance to achieve the same emissions reduction as specified in paragraphs (c)(1)(i), (c)(1)(ii), or (c)(1)(iii).

2. The owner or operator of each storage vessel with a capacity equal to or greater than 40,000 gal which contains a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 11.1 psia shall equip the storage vessel with one of the following:

- i. A closed vent system and control device as specified in (c)(1)(iii).
- ii. A alternative system equivalent to the system specified in (c)(1)(iii), as provided for in (c)(1)(iv).

d. Inspections. The owner or operator of each storage vessel subject to (c)(1)(i) through (c)(1)(iii) shall meet the requirements of (d)(1) through (d)(4) below; whichever is applicable.

1. After installing the control equipment required to meet (c)(1)(i) (fixed roof tank with an internal floating roof), the owner or operator shall, at a minimum:

- i. Prior to initially filling the storage vessel, conduct an inspection as specified in (d)(1)(iv).
- ii. Conduct periodic inspections according to the following schedule:
  - A. Inspect the storage vessel once every 12 months as specified in (d)(1)(v), and
  - B. Inspect the storage vessel each time the storage vessel is emptied and degassed, but at no time less frequently than once every 10 years, as specified in (d)(1)(iv).
- iii. For each vessel equipped with both a primary seal and a secondary seal the owner or operator may, in lieu of (d)(1)(ii), inspect the storage vessel each time the storage vessel is emptied and degassed, but at no time less frequently than once every 5 years, as specified in (d)(1)(iv).

- iv. The inspection required by (d)(1)(i), (d)(1)(ii)(B), or (d)(1)(iii) shall consist of a visual inspection of the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes and sleeve seals (if any).
  - A. If the internal floating roof has defects, the primary seal or the secondary seal is detached, or there are holes, tears, or other openings in the seal or the seal fabric, or the gaskets do not close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist.
  - B. The repair shall be made before the storage vessel is filled with VOL.
  - C. The owner or operator shall notify the Department in writing at least 30 days prior to the filling of the storage vessel for which the inspection specified in (d)(1)(iv) is required to afford the Department the opportunity to inspect the storage vessel prior to filling.
    - 1. If the inspection described in (d)(1)(iv) is not planned and the owner or operator could not have known about the inspection 30 days in advance of filling the tank, the owner or operator shall notify the Department at least 7 days prior to the filling of the storage vessel.
    - 2. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned.
- v. The inspection required by (d)(1)(ii)(A) shall consist of a visual inspection of the internal floating roof and the primary seal or the secondary seal (if one is in service) through access and roof hatches on the fixed roof.
  - A. If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, the owner or operator shall repair the item(s) or empty and remove the storage vessel from service within 45 days.

- B. If a failure that is detected during inspections required in (d)(1)(v) cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, a 30-day extension may be requested from the Department in the inspection report required by (e)(4)(ii).
    - C. Such a request for an extension must document that alternate storage capacity is unavailable and specify a schedule of actions the Company will take that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible.
- 2. After installing the control equipment required to meet (c)(1)(ii) (external floating roof) the owner or operator shall, at a minimum:
  - i. Conduct the following inspection and measurement:
    - A. Inspect the tank in accordance with (d)(2)(ii) prior to the initial fill and each time the storage vessel is emptied and degassed.
    - B. Determine the seal gap widths and the gap areas by the method described in (d)(2)(iii) according to the following schedule:
      - 1. Gaps between the tank wall and the primary seal shall be measured during the hydrostatic testing of the vessel or within 60 days of the initial fill with VOL, and at least once every 5 years thereafter.
      - 2. Gaps between the tank wall and the secondary seal shall be measured within 60 days of the initial fill with VOL and at least once per year thereafter.
      - 3. If any source ceases to store VOL for a period of 1 year or more, subsequent introduction of VOL into the vessel shall be considered an initial fill for the purposes of (d)(2)(i)(B)(1.) and (d)(2)(i)(B)(2.).
  - ii. Visually inspect the external floating roof, the primary seal, the secondary seal, and the fittings.
    - A. If the external floating roof has defects, the primary seal or the secondary seal is detached, or there are holes, tears, or other openings in the seal or the seal fabric, or the gaskets do not

close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist.

B. The repair shall be made before the storage vessel is filled with VOL.

C. The owner or operator shall notify the Department in writing at least 30 days prior to the filling of the storage vessel for which the inspection specified in (d)(2)(ii) is required to afford the Department the opportunity to inspect the storage vessel prior to filling.

1. If the inspection is not planned and the owner or operator could not have known about the inspection 30 days in advance of filling the tank, the owner or operator shall notify the Department at least 7 days prior to the refilling of the storage vessel.

2. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned.

iii. Seal gap widths and the gap areas shall be determined for the primary seal and for the secondary seal by the following methods:

A. Seal gap width.

1. Measure each seal gap width around the entire circumference of the tank in each place where a 1/8 inch (in) diameter uniform probe passes freely (without forcing or binding) between the seal and the wall of the storage vessel.

2. The roof shall be floating off the roof leg supports during the measurement.

3. Each seal gap width shall be measured by using probes of various widths.

B. Seal gap surface area.

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flow and VOC content under varying liquid level conditions (dynamic and static); and the manufacturer's design specifications for the control device.

2. If the control device or the closed vent capture system receives vapors, gases, or liquids other than fuels from sources that are not covered by this Section, the efficiency demonstration is to include consideration of all vapors, gases, and liquids received by the closed vent capture system and control device.

3. If an enclosed combustion device with a minimum residence time of 0.75 seconds and a minimum temperature of 816°C is used to meet the 95 percent requirements, documentation that those conditions will exist is sufficient to meet the requirements paragraph (d)(3)(i)(A).

B. A description of the parameter or parameters to be monitored to ensure that the control device will be operated in conformance with its design and an explanation of the criteria used for selection of that parameter (or parameters).

ii. Operate the closed vent system and control device and monitor the parameters of the closed vent system and control device in accordance with the operating plan submitted to the Department unless the operating plan was modified by the Department during the review process. In this case, the modified plan applies.

4. The owner or operator of each storage vessel that is equipped with a closed vent system and a flare as described in (c)(1)(iii) shall meet the requirements as specified in 40 CFR Part 60, paragraph 60.18 (July 1, 1992).

e. Recordkeeping. The owner or operator of each storage vessel subject to the standards in paragraph (c) shall keep records consistent with (e)(1), (e)(2), and (e)(3) (if applicable), and the records required by (e)(4) through (e)(7), whichever is applicable. All records, except for the records required by (e)(2) and by (e)(6)(i), shall be kept for at least 5 years and shall immediately be submitted to the Department upon verbal or written request. The records required by (e)(2) and by (e)(6)(i) shall be kept for the life of the source.

1. The owner or operator of each storage vessel shall maintain the following records:

i. The type of liquid stored.

- ii. The period of storage.
  - iii. The maximum true vapor pressure of that VOL during the respective storage period.
- 2. The owner or operator of each storage vessel shall maintain records showing the dimensions of the storage vessel and an analysis showing the capacity of the storage vessel.
- 3. The owner or operator of each vessel storing a mixture of indeterminate or variable composition shall:
  - i. Prior to the initial fill of the vessel, determine the maximum true vapor pressure for the range of anticipated liquid compositions to be stored.
  - ii. For vessels in which the vapor pressure of the anticipated liquid composition is greater than 1.0 psia but less than 1.5 psia, conduct an initial physical test of the vapor pressure; and a physical test at least once every 6 months thereafter as determined by one of the following methods:
    - A. ASTM Method D2879—83; or
    - B. ASTM Method D323—82; or
    - C. As measured by an appropriate method as approved by the Department.
- 4. After installing control equipment in accordance with (c)(1)(i) (fixed roof tank with an internal floating roof), the owner or operator shall:
  - i. Keep a record of each inspection performed as required by (d)(1)(i), (d)(1)(ii), or (d)(1)(iii). Each record shall identify:
    - A. The storage vessel on which the inspection was performed.
    - B. The date the vessel was inspected.
    - C. The observed condition of each component of the control equipment (seals, internal floating roof, and fittings).
  - ii. If any of the conditions described in (d)(1)(iv)(A) or in (d)(1)(v)(A) are detected a report shall be furnished to the Department pursuant to Section

(5)(b) of this Regulation.

5. After installing control equipment in accordance with (c)(1)(ii) (external floating roof), the owner or operator shall:
  - i. Keep a record of each inspection performed as required by (d)(2)(i)(A). Each record shall identify:
    - A. The storage vessel on which the inspection was performed.
    - B. The date the vessel was inspected.
    - C. The observed condition of each component of the control equipment (seals, internal floating roof, and fittings).
  - ii. Keep a record of each gap measurement performed as required by paragraph (d)(2)(i)(B). Each record shall identify:
    - A. The storage vessel in which the measurement was performed.
    - B. The date of measurement.
    - C. The raw data obtained in the measurement.
    - D. The calculations described in (d)(2)(iii)(B).
  - iii. If any condition stated in (d)(2)(ii)(A) exists or if any measurement or calculation indicates that any gap exceeds the limitations specified in (c)(1)(ii)(D)(4) or (c)(1)(ii)(D)(5), a report shall be submitted to the Department pursuant to Section (5)(b) of this Regulation.
6. After installing control equipment in accordance with (c)(1)(iii) (closed vent system and control device), other than a flare, the owner or operator shall keep the following records.
  - i. A copy of the operating plan required in (d)(3)(i).
  - ii. A record of the measured values of the parameters monitored in accordance with (d)(3)(ii).
  - iii. If any measurement or calculation indicates that the standard in (c)(1)(iii) was exceeded, a report shall be provided to the Department pursuant to Section (5)(b) of this Regulation.

7. After installing a closed vent system and a flare to comply with paragraph (c)(1)(iii) (closed vent system and control device) the owner or operator shall meet the following requirements.
  - i. Submit to the Department a report containing the measurements required by 40 CFR Part 60 paragraph 60.18(f)(1), (2), (3), (4), (5), and (6) (July 1, 1992) as required by 40 CFR Part 60 paragraph 60.8 (July 1, 1992). This report shall be submitted within 6 months of the initial startup date.
  - ii. Records shall be kept of all periods of operation during which the flare pilot flame is absent.
  - iii. If any record indicates that the pilot flame was absent, a report shall be provided to the Department pursuant to Section (5)(b) of this Regulation.
- f. Reporting. The owner or operator of any facility containing sources subject to this Section shall comply with the requirements of Section No. 5 of this Regulation.